The Novel biocatalytic cascade ZIF-8 capsule/Polysulfone Stereostructure and its Application in Amperometric Glucose Biosensors

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doi: 10.20964/2019.09.13

Received: 7 May 2019 / Accepted: 21 June 2019 / Published: 31 July 2019

In this study, we present a novel zeolitic imidazolate framework-8 metal–organic framework /polysulfone (PSF) stereostructure with glucose oxidase (GOx) and horseradish peroxidase (HRP) encapsulated in ZIF-8 as nanoreactors. This work links the high biocatalytic activity and great stability of the enzymes encapsulated in ZIF-8 with the large surface area and mass transport of the three-dimensional microporous PSF and highlights the pore structure of PSF, which blocks cells during whole blood testing. The prepared ZIF-8 capsule/PSF structure exhibits a 1.2-fold and 2.4-fold increase in sensitivity compared with the ZIF-8 capsule powder and bulk mixture of GOx and HRP, respectively. The modified ZIF-8 capsule/PSF glucose biosensor exhibited a 0-18 mM linear range and good selectivity. Furthermore, the prepared sensor attenuated less than 10% after 50 replicate whole blood tests. These advanced properties give the novel biocatalytic cascade ZIF-8 capsule/polysulfone stereostructure promising applications in whole blood monitoring.

Keywords: ZIF-8; nanostructure; glucose oxidase; horseradish peroxidase; glucose biosensor.

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